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ECOLOGY

VOL. III APRIL, 1922 NO. 2

THE HUMANIZING OF ECOLOGY[1]

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It may seem to some of us questionable that ecology should need to be brought into any special or intimate relation to considerations of human welfare (which is what I mean by humanizing ecology)—questionable whether the so-called practical bias is not already too pronounced; whether, indeed, ecology as it should be pursued and developed by its specialists has, or ought to have, anything whatever to do, positively or negatively, with any other than those intellectual interests to which it appeals as a science; whether there is any more reason to discuss in an ecological society the economic bearings of ecology than those of astronomy or mathematics in their special society meetings. But, whatever may be our present attitude toward the general question, it has seemed to me that it might be helpful to us as ecologists to try to see what the humanistic relations of ecology actually are or might be made to become; after which we shall be in more favorable position to decide what, if anything, ought to be done about them. I think that we all well understand and appreciate the economic and other humanistic values and applications of botany, including bacteriology, of zoology, including entomology, of physiology, especially as related to the protection and restoration of health and hence to the prolongation of human life; and we can understand also how immensely each of these sciences has profited in its cultivation and development, in all its divisions and in all directions, because of these relations. Now, ecology as a separate subject cuts across the other biological sciences at right angles, forming an integral part of each and at the same time a bond of union between them.

Dealing with the relations of plants and animals, singly or associated, to their environments, organic as well as inorganic, ecology furnishes a line of contact of each of them with the interests and welfare of man; for he is a part, and in a multitude of cases an all-important part, of the environment of other forms of life. The relationship of man himself to his environment is

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[1] Presidential address delivered before the Toronto meeting of Ecological Society of America, December 28, 1921.

[**Ecology,** Vol. III, No. 1 (pp. 1–88) was issued March 14, 1922]

an inseparable part of ecology; for he also is an organism and other organisms are a part of *his* environment. Ecology, therefore, broadly conceived and rightly understood, instead of being an academic science merely, out of touch with humanistic interests, is really that part of every other biological science which brings it into immediate relation to human kind.

The applied—the applicable—part of each of these sciences is simply and solely the ecological element which enters into its make-up. If we take the ecology out of botany or zoology, or out of any of their principal subdivisions, we have nothing whatever of it left which is capable of application to the material welfare of man. Ecology is, in short, of all the biological sciences, the humanistic science *par excellence,* and if we deprive it of its economic factor we take the economics out of all biology. This is not only a demonstrable fact, it is a logical necessity. If ecology is the science of the relation of organisms to their environment, including, of course, the *interactions* between the environment and the organism, and if man himself is an organism, then the relations of interaction between plants and animals on the one hand, and man on the other, are parts of ecology, and they contain the whole of applied biology. I must dissent, therefore, from the statement that applied ecology is no part of ecology itself—from the idea that the interactions between beetles and wasps is a part of *their* ecology, but that the interactions between beetles and man, between wasps and man, is not ecology, but only something closely related to it. Such a statement can be justified only by setting man outside the general order of living nature in a class by himself, as fundamentally different from other living things as· physiology is from chemistry, as engineering is from mathematics. We can do this, of course, if we choose, by an act of violence, but to do so is, in my judgment, injurious both to ecology in general and to the study of its humanistic applications. I would humanize ecology, therefore, first by taking the actions and relations of civilized man as fully into account in its definitions, divisions, and coordinations as those of any other kind of organism. The ecological system of the existing twentieth-century world must include the twentieth-century man as its dominant species—dominant, that is, in the sense of dynamic ecology as the most influential, the controlling member of his associate group. I would next seek to humanize it by urgently advising a careful study by economic biologists of the methods, contents, and products of general ecology, with a view to a knowledge of its bearings upon economic problems and its use in their solution; and by urging also an acquaintance by ecologists with the demands of applied biology sufficient to enable them to recognize and point out the bearings of the products of their own researches upon the problems of the economist. Not fusion, but intelligent cooperation, is what seems to me to be called for—a point which I may illustrate from my own observation and experience.

We have had in the service of the Natural History Survey of Illinois an ecologist and an entomologist engaged, among other things, upon the same economic problem—that of the life history of the codling-moth as affected by the varying meteorological conditions of successive years, and of different parts of the season in a single year. The economic object is to enable us to foretell in any year, by an observation of the weather of the advancing season, just when the orchardist may expect the beginning and culmination of that stage in the insect life history to which his insecticide must be applied. The entomologist has operated by the method of direct observation, with the aid of field laboratories equipped with apparatus for making continuous records of open-air temperatures, rainfall, humidity, and rate of evaporation; while the ecologist has used the experimental method in a laboratory provided with means of accurately *controlling* degrees of heat, light, moisture, air movement, and evaporation, thus studying separately the effect of various degrees and rates of change in each of the elements which enter into the complex of conditions that make up the weather of a day or a season—a complex which the *field entomologist* was compelled to take as a whole without distinction or separation of its parts. Now, it made no difference to the ecologist that his codling-moth was an economic insect; his studies were just as fruitful and their results as significant as if his choice had been made without reference to a possible economic application of his results. And it made no difference to the entomologist that the equipment and methods that he used had been devised for purposes much more general than those of economic entomology—perhaps with scarcely any idea of the possibility of their entomological application. But it was a decided advantage to both these investigators that they could keep continuous track of each other's work, checking each other's methods and comparing their conclusions as they went along. The entomologist completed his research and prepared his manuscript some months ago, but his paper has been held out of the press until lately in order that we might be quite sure of the essential harmony of the outcome of the two lines of work; and each has contributed to the common product important elements, scientific on the one hand and economic on the other, which could not possibly have been arrived at by either one alone.

In view of the widespread interest which ought, according to what I have been saying of the applicable values of ecology, to be taken in it by many classes of the people, I would further humanize ecology by eschewing its technical terms where they are not really necessary, except, of course, in papers intended solely for the technical ecologist. I am reminded here of the definition of ecology given, many years ago it is true, by a celebrated biologist, to the effect that it is the science which tells us what every one knows in language which no one can understand. It has got far beyond that point now in the novelty and originality of its disclosures, but it has made equal progress in the novelty and complexity of its terminology. This is useful, of course, to the specialist for its terseness and clearness, and so is unavoidable. But I commend to those who would make the products of their work generally interesting and profitable the expedient of the author of a bulletin on the prairie vegetation of Illinois, who appended to his technical treatise a non-technical summary, to be read, I am sure, with pleasure and comprehension by any intelligent person, although one might search the latest and largest dictionaries in vain for the meaning of some of the terms of his main treatise.

Measures of this kind are particularly desirable if we are to take the next step in my humanization process—that of introducing courses in ecology into the curricula of all students preparing for the pursuit of any branch of economic biology as a vocation. To load it with technical terms, devised for the sake of completeness and not really necessary to its comprehension, is to make it difficult and repellent to those to whom it should be most attractive, and to whom it might become most useful. In time, of course, its necessary names and expressions will become familiar to all concerned, as has been the case in agronomy and economic entomology, but progress to this end will be hastened if the way of the student is paved with flagstones instead of boulders. And finally, I would seek to humanize ecology by drawing into the ecological fellowship every practitioner of applied biology, in whatever other division of science his principal interest may lie, for he is already an ecologist in act whether the fact be recognized by him or not; and to shut himself out from the broad general field of ecological intercourse and inquiry is to cut himself off from what should be, or might be made, the main sources of his scientific inspiration. This we can do by not only making him welcome to membership in the Ecological Society of America and by giving him a place on our programs, both of which we already do, but by filling in and smoothing over the line of cleavage which now separates at too many points the strict ecologist from the economist—ecology as a pure science, so-called, from the method and art of its application to the well-being of man. But in making our special plea for the more nearly complete humanization of ecology we must not lose sight of the fact that the essential, the indispensable function of ecology is the exploration and development of those parts of the general field which lie outside the range and beyond the reach of the student of applied biology as such; and in the organization and generalization of those products of the other biological sciences which, without its coordinating and unifying touch, are likely to remain as incoherent fragments of their separate sciences.